

Memorandum

08-Sep-2015

To: Mike Lindgren, Chief Project Officer**From:** Nigel Lockyer, Director**Subject:** Director's Progress Review of the CMS Phase 2 upgrade project

Please organize and conduct a Director's Progress Review to assess the progress to date and plans for execution of the CMS Phase 2 upgrades. Upgrades to the CMS detector at the LHC will be needed for the future High Luminosity LHC running period, scheduled to start in 2026 and last about 10 years. These upgrades will be installed during Long Shutdown 3, which is scheduled to last for 30 months, starting in January 2024. The DOE has given a preliminary budget profile scenario. The project anticipates receiving Critical Decision 0 approval within the next year, so has not yet formally entered into the DOE project management system. This review is to inform the laboratory about the state of the overall planning, to provide guidance as to readiness to proceed to the CD-0 stage, and to help prepare for presentation of the projects plans to the DOE and NSF.

The focus of this review is to understand proposed project scope, R&D plans, cost range, schedule, management preparedness, and any other issues impacting readiness for beginning execution of the program. The review committee should respond to the following questions:

1. **Design and Scope.** Is the scope of the preliminary proposed US contributions well-aligned to the overall upgrade plan for CMS, and consistent with the goals outlined in the Particle Physics Project Prioritization Panel(P5)? Has the project identified a reasonable scope for which the DOE will be responsible, considering the early stage of the project planning? Have the performance requirements been defined, or is there a credible plan for doing so? Is there an adequate plan for independent design reviews? Are the designs described in the CMS Technical Proposal adequately developed to support the preliminary cost and schedule estimates? Is the R&D needed to design the upgrades well coordinated, funded at the appropriate level, and credible? Are the projected resources sufficient to complete the designs and R&D, and are these resources likely to be available when needed?
2. **Cost and Schedule.** Are the cost and schedule estimates at a level consistent with the current status of the project? Are the cost and schedule estimates credible and realistic, and is the final project likely to fit within the proposed cost range? Is the proposed US scope of work consistent with the projected available budget given the DOE preliminary profile and a likely NSF contribution and profile? Does the scheduling strategy fit with other major projects at Fermilab?
3. **Management.** Are the management teams, including partnering institutions, sufficiently defined and staffed considering the early stage of the project, and do they possess the requisite expertise and experience? Is the management team appropriately organized and staffed to initiate the CMS Phase 2 upgrade planning activities? Have the systems for managing interfaces between stakeholders been defined and are they appropriate? Is there a plan to develop management plan documents that are sufficient to manage the program? Is procurement planning sufficiently detailed and coordinated across the organizations involved for this stage of the project?

The committee is asked to present a draft of their report at the review closeout and to issue the final report within two weeks of the review's conclusion.

Nigel Lockyer
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